Air Quality Permitting
Statement of Basis

September 22, 2005

Permit to Construct No. P-050022

Council School District
Council, ID

Facility ID No. 003-00006

Prepared by:

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AIR QUALITY DIVISION

FINAL

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Acronyms, Units, and Chemical Nomenclatures

AACC	acceptable ambient concentration
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AP-42	Compilation of Air Pollutant Emissions Factors.
AQCR	Air Quality Control Region
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EI	emissions inventory
EL's	screening emissions levels
EPA	U.S. Environmental Protection Agency
gr	grain (1 lb = 7,000 grains)
HAPs	Hazardous Air Pollutants
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pound per hours
MACT	Maximum Achievable Control Technology
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
NAAQS	national ambient air quality standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NSPS	New Source Performance Standards
PAH	polyaromatic hydrocarbon
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	permit to construct
Rules	Rules for the Control of Air Pollution in Idaho
SIC	standard industrial classification
SIP	State Implementation Plan
SO_2	sulfur dioxide
TAP	toxic air pollutant
T/yr	tons per year
$\mu g/m^3$	micrograms per cubic meter
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, for issuing permits to construct.

2. FACILITY DESCRIPTION

The general natural of Council School District is education. The school district includes one elementary school and one secondary school.

3. FACILITY / AREA CLASSIFICATION

This facility is classified as a true minor facility because its potential to emit is less than all major source thresholds. The Standard Industrial Classification (SIC) defining the facility is 8211. The Aerometric Information Retrieval System (AIRS) classification is "B."

The facility is located within AQCR 63 and UTM zone 11. The facility is located in Adams County which is classified as unclassifiable for all criteria pollutants (PM_{10}, CO, NO_2, SO_2, lead, and ozone).

The AIRS information provided in Appendix A defines the classification for each regulated air pollutant at Council School District. This required information is entered into the EPA AIRS database.

4. APPLICATION SCOPE

The Council School District submitted a PTC application for the construction of a wood-fired boiler. This boiler will replace an existing oil-fired boiler.

4.1 Application Chronology

April 28, 2005	DEQ receives a 15-day pre-permit construction approval application
May 13, 2005	DEQ issues the pre-permit construction approval letter
May 27, 2005	DEQ declares the application complete
April 28, May 5, May 9 May 26, and July 15, 2005	DEQ receives additional information regarding emissions estimation and modeling

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC action.

5.1 Equipment Listing

The wood-fired boiler consists of a Hurst Boiler and a Messersmith Combustor, a gasifying, multi-chamber wood waste combustion system. The boiler is rated for 30 PSI water at maximum heat input rate of 2.5 MMBtu/hr. The Messersmith Combustor is a sloped grate assembly fed by a stoker auger. The boiler stack has a stack with a stack height of 34 feet, a stack exit diameter of 1.5 feet, a stack exit gas volume of 1,250 actual cubic feet per minute, and a stack exit gas temperature of 350°F.

5.2 Emissions Inventory

Based on the information provided by the applicant on April 28, May 5, May 9, May 26, and July 15,2005, DEQ conducted an emissions inventory (EI), including TAP emissions, for the boiler.

The emission factors were taken from a document titled "Wood-chip Fired Furnaces Testing Project Air Emissions Testing and Public Health Impacts Analysis." This document was developed by the Coalition of Northwestern Governors Policy Research Center Inc., in April 1996, Table 3-2 Summary of Emission Test results, CONEG/Green Acres Housing, in Barretown, Vermont, and is relevant for this analysis because the boiler at Barretown, Vermont has the same design as the proposed boiler for the Council School District. For the emissions factors that were not available from this document, emissions factors from AP-42 Section 1.6 (9/03) Wood Residue Combustion in Boilers were used.

Parameters from the boiler in Barretown, Vermont and from a similar boiler in Hardwick, Vermont were used for this analysis because they are the same boilers. The only difference is that the boiler at Hardwick, Vermont uses a multiclone to control particulate matter emissions. It was assumed that the multiclone had no effect on controlling formaldehyde emissions because formaldehyde emissions are in vapor form. Therefore, for emissions factor of formaldehyde, the test results from the boiler at Barretown, Vermont and the boiler at Hardwick, Vermont were averaged and used in the emissions estimation.

The hourly emissions rates were calculated by multiplying the design heat input rate of the boiler with the emission factors. The annul emissions rates were calculated by multiplying the annual fuel limit, bone dry ton fuel heat value, (1- fuel moisture content of 40%), and the emissions factors. The annual fuel limit was developed to ensure that the facility meets the acceptable ambient concentration (AACC) for formaldehyde.

Table 5.1 provides a summary EI for criteria air pollutants. Table 5.2 provides a summary EI for those TAPs that exceeded the respective net screening emissions levels (ELs) and required ambient air quality modeling. The detailed EI spreadsheet can be found in Appendix B.

Table 5.1 EMISSIONS ESTIMATES FOR CRITERIA AIR POLLUTANTS

Emissions Unit	PM_{10}		SO_2		VOC		NO_x		CO	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Wood fired Boiler	1.25	1.67	0.06	0.08	0.04	0.06	0.37	0.49	5.31	7.08

Table 5.2 TAP EMISSION RATES

Pollutant	Emission Rate at Boiler's Rated Capacity (lb/hr)	Average Hourly Emissions Rates with Annual Fuel Usage Limit (lb/hr)
Arsenic	6.65E-06	2.03E-06
Cadmium	4.45E-05	1.36E-05
Chromium VI	3.28E-06	9.99E-07
Formaldehyde	1.48E-02	4.52E-03
Nickel	5.28E-05	1.61E-05
PAH equivalent in potency to Benzo(a) pyrene	1.39E-5	4.23E-06
Total PAH	5.98E-04	1.82E-04

5.3 Modeling

The facility has demonstrated compliance, to DEQ's satisfaction, that this project will not cause or significantly contribute to a violation of any ambient air quality standards for PM_{10}, and NO_2. The emissions of CO, and SO_2 are below the modeling thresholds for criteria pollutants set in *State of Idaho Air Quality Modeling Guideline*. Therefore, no modeling analysis is required for CO and SO_2. The detailed modeling analysis is included in Appendix C. A summary of the modeling analysis is presented in Table 5.2.

Table 5.2 FULL IMPACT ANALYSIS RESULTS FOR PM_{10} AND NO_2

Pollutant	Averaging Period	Facility Ambient Impact ($\mu g/m^3$)	Background concentration ($\mu g/m^3$)	Total Ambient Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Percent of NAAQS
PM_{10}	24-hour	38.5	73	111.5	150	74.4%
	Annual	8.4	26	34.4	50	68.8%
NO_2	Annual	3.7	17	20.7	100	20.7%

The emissions of arsenic, cadmium, chromium VI, formaldehyde, nickel, PAHs with equivalent in potency to Benzo(a) pyrene, and total polyaromatic hydrocarbons (PAH) exceeded their respective ELs. Modeling was then required through the modeling analysis, it was determined that annual fuel usage needed to be limited to ensure compliance with all TAP increments. Therefore, fuel usage is limited to 618 T/yr.

Table 5.3 FULL IMPACT ANALYSIS RESULTS FOR TAPS

Pollutant	Average period	Modeled Concentration ($\mu g/m^3$)	Regulatory Limit ($\mu g/m^3$)	Percent of Limit
Arsenic	Annual	3.11E-05	2.30E-04	13.5%
Cadmium	Annual	2.09E-04	5.60E-04	37.3%
Chromium VI	Annual	1.53E-05	8.30E-05	18.5%
Formaldehyde	Annual	6.93E-02	7.70E-02	90.0%
Nickel	Annual	2.47E-04	4.20E-03	5.9%
PAH	Annual	1.16E0-5	3.00E-04	3.9%
Total PAH	Annual	2.79E-03	1.40E-02	19.9%

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201 .... Permit to Construct Required

Council School District is proposing to construct a wood-fired boiler to replace an existing oil-fired boiler. The proposed project does not qualify for an exemption under Sections 220 through 223 of the Rules; therefore, a Permit to Construction is required.

IDAPA 58.01.01.203.02 .... NAAQS

"No permit to construct shall be granted for a new or modified stationary source unless the applicant shows to the satisfaction of the Department all of the following: .... 02. NAAQS...."

The facility has demonstrated compliance, to DEQ's satisfaction, that this project will not cause or significantly contribute to a violation of any ambient air quality standards of PM_{10}, and NO_2, The emissions of CO, and SO_2 are below the modeling thresholds for criteria pollutants set in *State of Idaho Air Quality Modeling Guideline*. Therefore, no modeling analysis is required for CO and SO_2. The summary of the modeling analysis is in Table 5.2. Detailed modeling analysis is included in Appendix C.

IDAPA 58.01.01.203.03 .... Toxic Air Pollutants

"No permit to construct shall be granted for a new or modified stationary source unless the applicant shows to the satisfaction of the Department all of the following: .... 03. Toxic Air Pollutants Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586."

The emissions of arsenic, cadmium, chromium VI, formaldehyde, nickel, PAHs with equivalent in potency to Benzo(a) pyrene, and total polyaromatic hydrocarbons (PAH) exceeded their respective ELs. Modeling was then required through the modeling analysis, it was determined that annual fuel usage needed to be limited to ensure compliance with all TAP increments. Therefore, fuel usage is limited to 618 T/yr.

IDAPA 58.01.01.625 .... Visible Emissions

This regulation states that any point of emission shall not have a discharge of any air pollutant for a period aggregating more than three minutes in any 60-minute period of greater than 20% opacity.

The boiler stack, or any other stack, vent, or functionally equivalent opening associated with the boiler, are subject to this regulation. DEQ does not foresee the opacity exceedance when the boiler is under normal operation.

IDAPA 58.01.01 675 .... Fuel Burning Equipment

This regulation establishes particulate matter emission standards (grain loading standards) for fuel burning equipment. Fuel burning equipment is defined in IDAPA 58.01.01.006.41 as, "Any furnace, boiler, apparatus, stack and all appurtenances thereto, used in the process of burning fuel for the primary purpose of producing heat or power by indirect heat transfer."

This regulation is applicable to the wood fired boiler. The permittee shall not discharge PM to the atmosphere from any fuel-burning equipment in excess of 0.080 gr/dscf of effluent gas corrected to 8% oxygen by volume for wood products. The calculated results in the following demonstrate that the boiler is incompliance with the grain loading standard.

Standard exhaust flow was calculated using EPA Method 19 at 8% oxygen and the Fd factor of 9,240 dscf/MMBtu.

$$
\begin{aligned}
Vs\ (dscf/hr) &= Fd\frac{dscf}{MMBtu}\left(\frac{20.9}{20.9-\%O_2}\right)\times 2.5MMBtu/hr \\
&= \frac{9{,}240dscf}{MMBtu}\times\left(\frac{20.9}{20.9-8}\right)\times 2.5MMBtu/hr \\
&= 37{,}426\ dscf/hr
\end{aligned}
$$

$$
\begin{aligned}
E_{PM}\ (gr/hr) &= E_{PM,\,tested}\ (lb/hr)\times 7{,}000\ (gr/lb) \\
&= 0.30\ (lb/hr)\times 7{,}000\ (gr/lb) \\
&= 2{,}100\ (gr/hr)
\end{aligned}
$$

$$
PM\ emissons = \frac{E_{PM}(gr/hr)}{Vs(dscf/hr)} = \frac{2{,}100(gr/hr)}{37{,}426(dscf/hr)} = 0.056\ (gr/dscf) < 0.08(gr/dscf)
$$

Where,

Vs: boiler stack exit gas flowrate at dry standard condition.

$E_{PM,}$ tested: emissions rate calculated using source test data from "Wood-chip Fired Furnaces Testing Project Air Emissions Testing and Public Health Impacts Analysis," Table 3-2, Coalition of Northwestern Governors Policy Research Center Inc., April 1996.

40 CFR 60 .... New Source Performance Standards

The wood fired boiler has a rated heat input rate of 2.5 MMBtu/hr. It is less than 10 MMBtu/hr set in NSPS to subject to the standards. Therefore, this boiler is not an NSPS source.

40 CFR 61 and 63.................................. National Emission Standards for Hazardous Air Pollutants & MACT

This facility is not subject to NESHAP or MACT.

5.5 Permit Conditions Review

This section describes only those permit conditions as a result of this permit action.

5.5.1 Annual emission rate of formaldehyde is limited to be 39.6 pounds per year to ensure that the wood-fired boiler complies with toxic standards in accordance with IDAPA 58.01.01.210. At this emissions limit, the controlled ambient concentration is 90% of the acceptable ambient concentration listed in IDAPA 58.01.01.586. A corresponding operating requirement, maximum annual fuel usage of 618 tons per year, is established to ensure that the boiler complies with the annual emissions limit. Limiting annul formaldehyde emissions rate inherently limits the emissions rates of all other TAPs and the criteria pollutants.

5.5.2 The wood-fired boiler is subject to 20% opacity limit. Because this is gasifying, multi-chamber biomass combustion boiler, DEQ doesn't foresee the exceedance of the opacity limit under normal operation. However, the permittee is required in the permit to report the opacity excess emissions during start-up, showdown, maintenance, and upset in accordance with IDAPA 58.01.01.130-136.

5.5.3 The wood-fired boiler is subject to grain loading standard. At its rated capacity, the boiler is in compliance with this standard.

5.5.4 The permittee is required to operate the wood-fired boiler in accordance with manufacturer's recommendation. This document is required to be remained on site at all times and made available to DEQ representatives upon request. A copy of the document is required to be submitted to DEQ's Boise Regional Office. This operating requirement ensures that the boiler meets the formaldehyde emissions limit, the opacity limit, and the grain loading standard.

5.5.5 The permittee is required to monitor and record the monthly and annul fuel usage, and to keep the record for most recent two years.

6. PERMIT FEES

Council School District submitted a $1,000 PTC application fee on July 6, 2005, in accordance with IDAPA 58.01.01.224. Emissions increase of this boiler is between 1 to 10 tons range. In accordance with IDAPA 58.01.01.225, the PTC processing fee is $2,500. DEQ received the $2,500 on September 7, 2005.

Table 6.1 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
NO_X	0.49	0.00	0.49
SO_2	0.08	0.00	0.08
CO	7.08	0.00	7.08
PM_{10}	1.67	0.00	1.67
VOC	0.06	0.00	0.06
TAPS/HAPS	0.44	0.00	0.44
Total:	9.82	0.00	9.82
Fee Due	**$ 2,500.00**		

7. PERMIT REVIEW

7.1 *Regional Review of Draft Permit*

The draft permit was provided for Boise Regional Office review on July 22, 2005. The comments were received on July 26, 2005. They were addressed in this final permit.

7.2 *Facility Review of Draft Permit*

The facility didn't request to review the draft permit.

7.3 *Public Comment*

An opportunity for public comment on the PTC application was provided from June 9, 2005 to July 8, 2005 in accordance with IDAPA 58.01.01.209.01.c. During this time, there were not comments on the application and no requests for a public comment period on DEQ's proposed action.

8. RECOMMENDATION

Based on review of application materials, and all applicable state and federal rules and regulations, staff recommend that Council School District be issued a final PTC No. P-050022 for the wood-fired boiler. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

SC/sd Permit No. P-050022

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Appendix A

AIRS Information

P-050022

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Facility Name: Council School District #13
Facility Location: Council, ID
AIRS Number: 003-00006

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	B						B	U
NO_x	B						B	U
CO	B						B	U
PM_{10}	B						B	U
PT (Particulate)	B							
VOC	B						B	U
THAP (Total HAPs)	B						B	
			APPLICABLE SUBPART					

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] <u>AIRS/AFS Classification Codes</u>:

- A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.
- SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
- B = Actual and potential emissions below all applicable major source thresholds.
- C = Class is unknown.
- ND = Major source thresholds are not defined (e.g., radionuclides).

Appendix B

Emissions Inventory

P-050022

SOURCE / FACILITY / USER INPUT SUMMARY

COMPANY:	**Council School District**				
EMISSION SOURCE DESCRIPTION:	2.5 MMBtu/hr Bark and Wet Wood Fired Boiler				
EMISSION SOURCE ID NO.:	003-00006				
PARTICULATE CONTROL DEVICE:	None				
SOURCES OF EMISSION FACTORS:	AP-42 1.6 (rev. 9/03), and "Wood-chip Fired Furnaces Testing Project Air Emissions Testing and Public Health Impacts Analysis", Coalition of Northwestern Governors Policy Research Center,Inc., April 1996				fuel moisture content: 40%
ACTUAL FUEL THROUGHPUT:	<300	TON/YR	FUEL HEAT VALUE:	9,000	BTU/BON DRY LB
POTENTIAL FUEL THROUGHPUT:	2,028	TON/YR	BOILER TYPE:	Gasification, multi-chambers	
REQUESTED MAX. FUEL THROUGHPUT	618	TON/YR	CORRESPONDING OPERATION HOURS:	2,670	HOURS

CRITERIA AIR POLLUTANT EMISSIONS INFORMATION

AIR POLLUTANT EMITTED	POTENTIAL EMISSIONS WITH OPERATION LIMIT lb/hr, max	POTENTIAL EMISSIONS WITH OPERATION LIMIT tons/yr	EMISSION FACTOR lb/MMBtu uncontrolled	note
PARTICULATE MATTER (PM), MEASURED BY EPA METHOD 5	0.30	0.40	1.200E-01	2
PARTICULATE MATTER<10 MICRONS (PM_{10})	1.25	1.67	5.000E-01	1
SULFUR DIOXIDE (SO2)	0.06	0.08	2.500E-02	1
NITROGEN OXIDES (NOx)	0.37	0.49	1.460E-01	2
CARBON MONOXIDE (CO)	5.31	7.08	2.123E+00	2
VOLATILE ORGANIC COMPOUNDS (VOC)	0.04	0.06	1.700E-02	1
LEAD	1.29E-04	1.72E-04	5.160E-05	2

TOXIC / HAZARDOUS AIR POLLUTANT EMISSIONS INFORMATION

TOXIC / HAZARDOUS AIR POLLUTANT	CAS NUMBER	POTENTIAL EMISSIONS WITH OPERATION LIMIT lb/hr, max	POTENTIAL EMISSIONS WITH OPERATION LIMIT lb/hr, annual avg (5)	Exceed EL ? yes/no	EMISSION FACTOR lb/MMBtu uncontrolled	note	STANDARDS EL (585/586)	STANDARDS ACC (mg/m³, 24-hour average)	STANDARDS AACC (ug/m³, annual average)
Acenaphthene		1.88E-06			7.530E-07	2			
Acenaphthylene		8.33E-05			3.330E-05	2			
Acetaldehyde (HAP)	75070	2.08E-03	6.32E-04	no	8.300E-04	1	3.00E-03		4.50E-01
Acetone		4.75E-04			1.900E-04	1			
Acetophenone (HAP)	98862	8.00E-09			3.200E-09	1			
Acrolein (HAP)	107028	1.00E-02		no	4.000E-03	1	0.017	0.0125	
Anthracene		6.10E-06			2.440E-06	2			
Antimony(HAP)	7440-36-0	1.98E-05		no	7.900E-06	1	0.033	0.025	
Arsenic (HAP)	7440-38-2	6.65E-06	2.03E-06	yes	2.660E-06 (<)	2	1.50E-06		2.30E-04
Barium	7440-39-3	2.68E-04		no	1.070E-04	2	0.033	0.025	
Benzaldehyde <		2.13E-06			8.500E-07	1			
Benzene (HAP)	71432	1.12E-04	3.42E-05	no	4.494E-05 (<)	2	8.00E-04		1.20E-01
Equivalent in potency to Benzo(a)pyrene, total		1.39E-05	7.55E-07	yes			2.00E-06		3.00E-04
Benzo(a)pyrene	50328	2.48E-06			9.910E-07	2			
Benzo(b)fluoranthene		2.50E-07			1.000E-07	1			
Benzo(k)fluoranthene		9.00E-08			3.600E-08	1			
Chrysene		7.88E-06			3.150E-06	2			
Indeno(1,2,3,c,d)pyrene		3.20E-06			1.280E-06	2			
Benzo(a)anthracene		3.85E-06			1.540E-06	2			
Benzo(b)fluoranthene		9.15E-06			3.660E-06	2			
Benzo(k)fluoranthene		1.95E-06			7.790E-07	2			
Benzo(e)pyrene		5.95E-06			2.380E-06	2			
Benzo(g,h,i)perylene		4.83E-06			1.930E-06	2			
Benzo(j,k)fluoranthene		4.00E-07			1.600E-07	1			
Benzo(a)pyrene (T)	50328	2.48E-06			9.910E-07	2			
Benzoic acid		1.18E-07			4.700E-08	1			
Beryllium (HAP)	440-41-7	6.28E-07	1.91E-07	no	2.510E-07 (<)	2	2.80E-05		4.20E-03
bis(2-Ethylhexyl)phthalate (HAP)	117-81-7	1.18E-07	3.58E-08	no	4.700E-08	1	2.80E-02		4.20E+00
Bromomethane		3.75E-05			1.500E-05	1			
Butanone, 2 - (MEK)	78-93-3	1.35E-05		no	5.400E-06	1	39.3	29.5	
Cadmium(HAP)	7440-43-9	4.45E-05	1.36E-05	yes	1.780E-05 (<)	2	3.70E-06		5.60E-04
Carbazole		4.50E-06			1.800E-06	1			
Carbon tetrachloride (HAP)	56235	1.13E-04	3.43E-05	no	4.500E-05	1	4.40E-04		6.70E-02
Chlorine (HAP)	7782505	1.98E-03		no	7.900E-04	1	0.2	0.15	
Chlorobenzene (HAP)	108907	8.25E-05		no	3.300E-05	1	23.3	17.5	
Chloroform (HAP)	67663	7.00E-05	2.13E-05	no	2.800E-05	1	2.80E-04		4.30E-02
Chloromethane		5.75E-05			2.300E-05	1			
Chloronaphthalene, 2-		1.30E-08			5.160E-09	2			
Chlorophenol,2-	95-57-8	6.00E-08		no	2.400E-08	1	0.033	0.025	
Chromium - All/Total (HAP)	CRC	6.60E-05			2.640E-05	1			
Chromium - (All/Total - Chromium (VI))	7440-47-3	6.27E-05		no	2.509E-05	3	0.033	0.025	
Chromium (VI) (T)	7440-47-3	3.28E-06	9.99E-07	yes	1.311E-06	2	5.60E-07		8.30E-05

Chrysene		7.88E-06			3.150E-06	2			
Cobalt (HAP)	7440-48-4	1.63E-05		no	6.500E-06	1	0.0033	0.0025	
Copper	7440-50-8	1.60E-04		no	6.390E-05	2	0.013	0.01	
Crotonaldehyde	123-73-9	2.48E-05		no	9.900E-06	1	0.38	0.285	
Decachlorobiphenyl		6.75E-10			2.700E-10	1			
Dibenzo(a,h)anthracene		3.33E-07			1.330E-07	2			
Dibromoethene, 1,2 -		1.38E-04			5.500E-05	1			
Dichlorobiphenyl		1.85E-09			7.400E-10	1			
Dichloroethane , 1,2-	107-06-2	7.25E-05	2.21E-05	no	2.900E-05	1	2.50E-04		3.80E-02
Dichloromethane	75-09-2	7.25E-04	2.21E-04	no	2.900E-04	1	1.60E-03		2.40E-01
Dichloropropene 1,2-		8.25E-05			3.300E-05	1			
Dinitrophenol, 2,4- (HAP)	51285	4.50E-07			1.800E-07	1			
Ethyl benzene (HAP)	100414	7.75E-05		no	3.100E-05	1	29	21.75	
Fluoranthene		2.35E-05			9.360E-06	2			
Fluorene		1.56E-06			6.220E-07	2			
Formaldehyde (HAP)	50000	1.48E-02	4.52E-03	yes	5.926E-03	2,6	5.10E-04		7.70E-02
Heptachlorobiphenyl		1.65E-10			6.600E-11	1			
Hexachlorobiphenyl		1.38E-09			5.500E-10	1			
Hexanal		1.75E-05			7.000E-06	1			
Heptahclorodibenzo-p-dioxins		5.00E-09			2.000E-09	1			
Heptahclorodibenzo-p-furans		6.00E-10			2.400E-10	1			
Hexachlorodibenzo-p-dioxins		4.00E-06			1.600E-06	1			
Hexachlorodibenzo-p-furans		7.00E-10			2.800E-10	1			
Hydrogen chloride (TH)	7647010	4.75E-02		no	1.900E-02	1	0.05	0.375	
Indeno(1,2,3,c,d)pyrene		2.18E-07			8.700E-08	1			
Iron	7439896	2.48E-03		no	9.900E-04	1	0.053	0.04	
Isobutyraldehyde		3.00E-05			1.200E-05	1			
Lead (H)	PBC	1.29E-04			5.160E-05	2			
Methane		5.25E-02			2.100E-02	1			
Methylnaphthalene,2-		3.30E-05			1.320E-05	2			
Monochlorobiphenyl		5.50E-10			2.200E-10	1			
Manganese (HAP)	7439-96-5	1.39E-03			5.570E-04	2			
Dust & compounds	7439-96-5			no			0.333	0.25	
Fume	7439-96-5			no			0.067	0.05	
Mercury (HAP)	7439-97-6	8.75E-06			3.500E-06	1			
Aryl & Inorganic compounds as Hg				no			0.007	0.005	
Alkyl & Inorganic compounds as Hg				no			0.001	0.0005	
vapors except alkyl as Hg				no			0.003	0.0025	
Molybdenum	7439-98-7	5.25E-06			2.100E-06	1			
soluble compounds				no			0.333	0.25	
Insoluble compounds				no			0.667	0.5	
Naphthalene (HAP)	91203	3.15E-04		no	1.260E-04	2	3.33	2.5	
Nickel (HAP)	7440-02-0	5.28E-05	1.61E-05	yes	2.110E-05	2	2.70E-05		4.20E-03
Nitrophenol, 4- (HAP)	100027	2.75E-07			1.100E-07	1			
Nitrophenol, 2- (H)	100027	6.00E-07			2.400E-07	1			
Octachlorodibenzo-p-dioxins		1.65E-07			6.600E-08	1			
Octachlorodibenzo-p-furans		2.20E-10			8.800E-11	1			
Polyaromatic Hydrocarbons (PAH), total (HAP)		5.98E-04	1.82E-04	yes	2.393E-04	2	9.10E-05		1.40E-02
Naphthalene (HAP)	91203	3.15E-04			1.260E-04	2	3.33	2.5	
Methylnaphthalene,2-		3.30E-05			1.320E-05	2			
Acenaphthene		1.88E-06			7.530E-07	2			
Chloronaphthalene, 2-		1.30E-08			5.180E-09	2			
Acenaphthylene		8.33E-05			3.330E-05	2			
Fluorene		1.56E-06			6.220E-07	2			
Phenanthrene		6.68E-05			2.670E-05	2			
Anthracene		6.10E-06			2.440E-06	2			
Fluoranthene		2.70E-05			1.080E-05	2			
Pyrene		2.35E-05			9.380E-06	2			
Benzo(a)anthracene		3.85E-06			1.540E-06	2			
Chrysene		7.88E-06			3.150E-06	2			
Perylene		5.20E-07			2.080E-07	2			
Benzo(b)fluoranthene		9.15E-06			3.660E-06	2			
Benzo(k)fluoranthene		1.95E-06			7.790E-07	2			
Benzo(a)pyrene (T)		2.48E-06			9.910E-07	2			
Benzo(e)pyrene		5.95E-06			2.380E-06	2			
Benzo(g,h,l)perylene		4.83E-06			1.930E-06	2			
Indeno(1,2,3,c,d)pyrene		3.20E-06			1.280E-06	2			
Dibenzo(a,h)anthracene		3.33E-07			1.330E-07	2			

Pentachlorodibenzo-o-dioxins		3.75E-09			1.500E-09	1			
Pentachlorodibenzo-o-furans		1.05E-09			4.200E-10	1			
Pentachlorobiphenyl		3.00E-09			1.200E-09	1			
Pentachlorophenol (HAP)	87865	1.28E-07		no	5.100E-08	1	0.033	0.025	
Perylene		5.20E-07			2.080E-07	2			
Phenanthrene		6.68E-05			2.670E-05	2			
Phenol (HAP)	108952	1.28E-04		no	5.100E-05	1	1.27	0.95	
Phosphorus (HAP)	7723140	6.75E-05		no	2.700E-05	1	0.007	0.005	
Potassium		9.75E-02			3.900E-02	1			
Propanal		8.00E-06			3.200E-06	1			
Propionaldehyde (HAP)	123386	1.53E-04		no	6.100E-05	1	0.0287	0.0215	
Pyrene		2.35E-05			9.380E-06	2			
Selenium(HAP)	7782-49-2	7.80E-06		no	3.120E-06 (<)	2	0.013	0.01	
Silver		6.70E-06			2.880E-06 (<)	2			
metal	7440-22-4			no			0.007	0.005	
soluble compounds, as Ag	7440-22-4			no			0.001	0.005	
		9.00E-04			3.600E-04	1			
Strontium		5.75E-05			2.300E-05	1			
Styrene (HAP)	100425	4.75E-03		no	1.900E-03	1	6.67	1	
Tetrachlorodibenzo-p-dioxins, 2,3,7,8- (HAP)	1746016	2.15E-11	6.55E-12	no	8.600E-12	1	1.50E-10		2.20E-08
Total Dioxin/Furan		2.83E-11	8.61E-12	no	1.130E-11	2	1.50E-10		2.20E-08
Tetrachlorodibenzo-p-dioxins		1.18E-09			4.700E-10	1			
Tetrachlorodibenzo-p-furans, 2,3,7,8- (TH)		2.25E-10			9.000E-11	1			
Tetrachlorodibenzo-p-furans		1.88E-09			7.500E-10	1			
Tetrachlorobiphenyl		6.25E-09			2.500E-09	1			
Tetrachloroethene		9.50E-05			3.800E-05	1			
Tin		5.75E-05			2.300E-05	1			
metal	7440-31-5			no			0.133	0.1	
oxide & inorganic compounds, except SnH_4 as Sn	na			no			0.133	0.1	
Organic compounds, as Sn				no			0.007	0.005	
Titanium		5.00E-05			2.000E-05	1			
Tolualdehyde o,-		1.80E-05			7.200E-06	1			
Tolualdehyde p,-		2.75E-05			1.100E-05	1			
Toluene (HAP)	108883	2.30E-03		no	9.200E-04	1	25	18.75	
Trichlorobiphenyl		6.50E-09			2.600E-09	1			
Trichloroethane 1,1,1-		7.75E-05			3.100E-05	1			
Trichloroethylene (HAP)	79016	7.50E-05	2.29E-05	no	3.000E-05	1	5.10E-04		7.70E-01
Trichlorofluoromethane (CFC 111) (T)	75694	1.03E-04			4.100E-05	1			
Trichlorophenol, 2,4,6- (HAP) <	88062	5.50E-06	1.68E-06	no	2.200E-06	1	1.20E-03		1.80E-01
Vanadium		4.38E-06			9.800E-07	1, 4			
as V2O5, respirable dust & fume	1314-62-1			no			0.003	0.0025	
Vinyl chloride (HAP)	75014	4.50E-05	1.37E-05	no	1.800E-05	1	9.40E-04		1.40E-01
Xylene, o- (HAP)	95476	6.25E-05			2.500E-05				
Xylene, (o, m,p- isomers) (H)	1330-20-7			no			29	21.75	
Yttrium	7440-65-5	7.50E-07		no	3.000E-07	1	0.067	0.05	
Zinc	7440-66-6	8.62E-02		no	6.130E-04	2	0.667	0.5	
Total HAPs (Ton/yr): 0.11 T/yr		8.51E-02							
Total TAPs (tons/yr) 0.44 T/yr		3.29E-01							

1 Emissions factors taken from AP-42 Section 1.6 (9/03)

2 Emissions factors taken from "Wood-chip Fired Furnaces Testing Project Air Emissions Testing and Public Health Impacts Analysis", Coalition of Northwestern Governors Policy Research Center,Inc., April 1996, Table 3-2.

3 Emissions factor for chromium metal, chromium II and chromium III = emissions factor for total chromium - emissions factors for chromium (VI)

4 In IDAPA 58.01.01.585, the EL and AAC is for V (74440-62-2) expressed as V2O5 (1314-62-1). This Vanadium emissions rate is converted to V2O5 by: AP-42 emissions factor (lb/MMBtu) x heat input rate (MMBtu/hr) of V x (1 lbmol of V2O5 /2 lbmol of V) x

5 Annual average lb/hr = lb/hr, max * (618 wet tons wood/yr) * (9,000 Btu/bone dry lb) * (A160(1-40%) bone dry lb/lb wet fuel) * (2000 lb/tons) / (2.5E+06 Btu/hr) / (8760 hr/yr)

6 The average of the emissions factors taken from "Wood-chip Fired Furnaces Testing Project Air Emissions Testing and Public Health Impacts Analysis", Coalition of Northwestern Governors Policy Research Center,Inc., April 1996, Table 3-2 and Table 3-3.

Appendix C

Modeling Review

P-050022

MEMORANDUM

DATE: July 27, 2005

TO: Shawnee Chen, Air Quality Division

THROUGH: Kevin Schilling, Stationary Source Modeling Coordinator, Air Quality Division KS

FROM: Dustin Holloway, Modeling Analyst, Air Quality Division

PROJECT NUMBER: P-050022

SUBJECT: Modeling Review for the Council School District

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1. SUMMARY

Spidell and Associates conducted air quality dispersion modeling for the Council School District in support of a permit to construct (PTC) application for a wood-fired heating system. The only source at this facility is the new wood-fired heating system. The following table summarizes the key assumptions used in the dispersion modeling analysis which should be considered when developing the permit.

Table 1.1 KEY ASSUMPTIONS USED IN MODELING ANALYSIS

Assumption	Explanation
The boiler will consume no more than 618 tons of wood per year.	The analysis used this assumption to demonstrate that the burner would not cause or significantly contribute to a violation of any ambient air quality standards.

Based on the results of the applicant's and DEQ's analyses, DEQ has determined that the modeling analysis: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) appropriately adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed that predicted pollutant concentrations at all receptor locations, when appropriately combined with background concentrations, were below stated air quality standards; 5) showed that the increase in toxic air pollutant (TAP) concentrations are within the applicable allowable concentrations in IDAPA 58.01.01.585-586.

2. BACKGROUND INFORMATION

2.1 Applicable Air Quality Impact Limits

The Council School District is located in Council, in Adams county. Adams county is designated attainment or unclassifiable for all criteria air pollutants. Table 2.1 provides significant contribution levels (SCL), national ambient air quality standards (NAAQS) for criteria pollutants, and allowable TAP increments. Project-specific emissions above the SCL necessitate facility-wide modeling to demonstrate compliance with NAAQS.

Table 2.1 APPLICABLE REGULATORY LIMITS

Pollutant	Averaging Period	Significant Contribution Levels ($\mu g/m^3$)[a, b]	Regulatory Limit ($\mu g/m^3$)[c]	Modeled Value Used[d]
PM_{10}[e]	Annual	1	50[f]	Maximum 1st highest[g]
	24-hour	5	150[h]	Maximum 6th highest[i] Highest 2nd highest[j]
SO_2	Annual	1	80[f]	Maximum 1st highest[g]
	24-hour	5	365[k]	Highest 2nd highest[g]
	3-hour	25	1,300[k]	Highest 2nd highest[g]
NO_2	Annual	1	100[f]	Maximum 1st highest[g]
Non-Carcinogens				
Silver	24-hour	N/A	5.0	Maximum 1st highest[g]
Carcinogens				
Arsenic	Annual	N/A	2.30E-04	Maximum 1st highest[g]
Cadmium	Annual	N/A	5.60E-04	Maximum 1st highest[g]
Chromium VI	Annual	N/A	8.30E-05	Maximum 1st highest[g]
Formaldehyde	Annual	N/A	7.70E-02	Maximum 1st highest[g]
Nickel	Annual	N/A	4.20E-03	Maximum 1st highest[g]
PAH[l]	Annual	N/A	3.00E-04	Maximum 1st highest[g]
Total PAH	Annual	N/A	1.4E-02	Maximum 1st highest[g]

[a] IDAPA 58.01.01.006.93
[b] Micrograms per cubic meter
[c] IDAPA 58.01.01.577 for criteria pollutants, IDAPA 58.01.01.585 for non-carcinogenic toxic air pollutants IDAPA 58.01.01.586 for carcinogenic toxic air pollutants.
[d] The maximum 1st highest modeled value is always used for significant impact analysis and for all toxic air pollutants.
[e] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[f] Never expected to be exceeded in any calendar year.
[g] Concentration at any modeled receptor.
[h] Never expected to be exceeded more than once in any calendar year.
[i] Concentration at any modeled receptor when using five years of meteorological data.
[j] The highest 2nd high is considered to be conservative for five years of meteorological data.
[k] Not to be exceeded more than once per year.
[l] Specific PAHs as listed in IDAPA 58.01.01.586 compared to the AACC for benzo(a)pyrene.

2.2 *Background Concentrations*

DEQ updated the background concentration data for Idaho in the Spring of 2003[1]. The default background concentrations for rural/agricultural areas were used in this analysis. The following table summarizes the background concentrations used in this analysis.

Table 2.2 BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background concentrations ($\mu g/m^3$)[a]
PM_{10}	24-hour	73
	Annual	26
NO_2	Annual	17

[a] Micrograms per cubic meter.

[1] Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling*. Memorandum to Mary Anderson, March 14, 2003.

3. ASSESSMENT OF MODELING ANALYSIS

3.1 Modeling Methodology

Spidell and Associates performed the modeling analysis for the Council School District. The analysis included a significant impact analysis for criteria pollutants whose emissions exceeded modeling thresholds, a full-impact analysis for those pollutants that exceeded their respective SCL, and a TAP analysis. The following table summarizes the modeling parameters used and DEQ's review and determination of those parameters.

Table 3.1 MODELING PARAMETERS

Parameter	What Facility Submitted	DEQ's Review/Determination
Modeling protocol	A protocol was submitted, but it was not received prior to the application.	DEQ was not able to review the protocol prior to receipt of the application. However, a prior application contained the same modeling analysis and was reviewed by DEQ. The submitted analysis was conducted with acceptable methods and assumptions.
Model Selection	ISCPRIME	This is an appropriate model for this facility
Meteorological Data	1987-1991 Boise meteorological data rotated 70° clockwise to account for the differences in valley orientations.	The Boise meteorological data is the most representative data available for this area. DEQ ran the model with the meteorological data in both normal and rotated form.
Model Options	Regulatory default	This is appropriate for this analysis.
Land Use	Rural	The population density within three kilometers of this facility is less than 750 people per square kilometer.
Terrain	Terrain effects were accounted for	Receptor elevations were included in the analysis and the model was run to account for the effects of simple and elevated terrain.
Building Downwash	Downwash effects were calculated	The PRIME algorithm was used to estimate the effects of both building wakes and building cavity regions.
Receptor Network	25 meter spacing out to 275 meters; 50 meter spacing out to 875 meters; The analysis does not contain a fenceline	No fenceline was included because public access is not restricted on the facility.
Facility Layout	N/A	The facility layout was verified by comparing it to the submitted facility plot plan and aerial photographs.

3.2 Emission Rates

The following tables summarize the emission rates used in the dispersion modeling analysis.

Table 3.2 EMISSION RATES

Source ID	Source Description	PM_{10} (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	TAPs[a] (lb/hr)
BLRSTK	Wood-fired heating system	1.25	0.063	0.55	1.0

[a] Used to determine the 1 lb/hr modeled concentration from the boiler.

Table 3.3 TAP EMISSION RATES

Pollutant	Emission Rate (lb/hr)[a]
Arsenic	2.03E-06
Cadmium	1.36E-05
Chromium VI	9.99E-07
Formaldehyde	4.52E-03
Nickel	1.61E-05
PAH	7.55E-07
Total PAH	1.82E-04

[a] TAP emissions used in the modeling analysis are the average hourly rate over an entire year.

TAP concentrations were estimated by calculating the concentration caused by one pound per hour of pollutant from the boiler. The resulting concentration is then multiplied by the actual maximum pound per hour emission rate for each TAP to determine the ambient concentration.

3.3 Emission Release Parameters

The following table summarizes the emission release parameters of the boiler that were used in the modeling analysis.

Table 3.4 EMISSION RELEASE PARAMETERS

Source ID	Easting (m)	Northing (m)	Elevation (m)	Stack Height (ft)	Temperature (°F)	Exit Velocity (m/s)	Stack Diameter (ft)
BLRSTK	544,380.4	4,952,574.6	888.8	34	350	3.6	1.5

3.4 Results

DEQ ran the model with rotated meteorological data as submitted by the applicant and without rotating the meteorological data. The results used in this analysis were the worst case from both of those scenarios. The following tables summarize the results from the dispersion modeling analysis.

3.4.1 Significant Impact Analysis Results

Table 3.5 SIGNIFICANT IMPACT ANALYSIS RESULTS

Pollutant	Averaging Period	Ambient Concentration ($\mu g/m^3$)	Significant Contribution Levels ($\mu g/m^3$)	Exceeds the SCL (Y or N)
PM_{10}	24-hour	38.54	5	Y
	Annual	8.38	1	Y
SO_2	3-hour	2.22	25	N
	24-hour	3.57	5	N
	Annual	0.42	1	N
NO_2	Annual	3.69	1	Y

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3.4.2 Full Impact Analysis Results

Table 3.6 FULL IMPACT ANALYSIS RESULTS

Pollutant	Averaging Period	Facility Ambient Impact (µg/m³)	Background Concentration (µg/m³)	Total Ambient concentration (µg/m³)	NAAQS (µg /m³)	Percent of NAAQS
PM_{10}	24-hour	38.5	73	111.5	150	74.4%
	Annual	8.4	26	34.4	50	68.8%
NO_2	Annual	3.7	17	20.7	100	20.7%

3.4.3 Toxic Air Pollutants Results

Table 3.7 TAP ANALYSIS RESULTS

	Modeled Concentration (µg/m3)	AACC (µg/m3)	Percent of AACC
Arsenic	3.11E-05	2.30E-04	13.5%
Cadmium	2.09E-04	5.60E-04	37.3%
Chromium VI	1.53E-05	8.30E-05	18.5%
Formaldehyde	6.93E-02	7.70E-02	90.0%
Nickel	2.47E-04	4.20E-03	5.9%
PAH	1.16E-05	3.00E-04	3.9%
Total PAH	2.79E-03	1.4E-02	19.9%

The results of the dispersion modeling analysis demonstrate, to DEQ's satisfaction, that the project will not cause or significantly contribute to a violation of any NAAQS, nor will the project cause an increase in ambient TAP concentrations that exceed the increments listed in IDAPA 58.01.01.585-586.